

## *Acleris effractana* (Hübner, 1799) – a Holarctic Tortricid

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**Abstract.** The discovery by Leraut (2003) of the existence of a species closely related to *Acleris emargana* (Fabricius, 1775) is confirmed. It is shown that this was already known to lepidopterists in the first half of the 19th century, but like many *Acleris* names later regarded as only a form, the name *Acleris effractana* (Hübner, 1799) is the oldest name for the species. A neotype for *A. effractana* is designated. *A. effractana* is shown to have a Holarctic distribution, with occurrence only in the northern part of Europe. *A. emargana blackmorei* Obraztsov, 1963 (**syn. n.**) and *Acleris stettinensis* Leraut, 2003 (**syn. n.**) are synonyms of *A. effractana* (Hübner). *A. effractana* is compared with *A. emargana* (Fabricius, 1775). Details of the variation in adults, biology and distribution of these two species are presented, and adults and genitalia are illustrated.

**Zusammenfassung.** Die Entdeckung der Existenz einer mit *Acleris emargana* (Fabricius, 1775) nahe verwandten Art durch Leraut (2003) wird bestätigt. Es wird nachgewiesen, dass diese Tatsache bereits Lepidopterologen der ersten Hälfte des 19. Jahrhunderts bekannt war, wobei der Name *Acleris effractana* der älteste ist, aber wie viele andere *Acleris*-Namen später nur als Form behandelt wurde. Ein Neotypus für *A. effractana* wird hier designiert. *A. effractana* weist eine holarktische Verbreitung auf und ist in Europa auf die nördlichen Regionen beschränkt. *A. emargana blackmorei* Obraztsov 1963 (**syn. n.**) und *Acleris stettinensis* Leraut, 2003 (**syn. n.**) sind Synonyme von *A. effractana*. *A. effractana* wird mit *A. emargana* verglichen und die Variation, Biologie und Verbreitung beider Arten werden beschrieben sowie Imagines und Genitalien abgebildet.

**Key words.** Holarctic, variation, sibling species, *Salix*.

### Introduction

Members of the genus *Acleris* Hübner, 1825 are among the most popular Microlepidoptera. The genus includes several beautiful species, and also some with extraordinary variability. During the 18th and 19th century many of the forms were thought to represent distinct species and were given names as such. Later on, especially during the first half of the 20th century, some authors, notably Sheldon (1930–31), tried to classify the forms of the variable species, proposing a large number of additional names for the forms. The nomenclature of many European *Acleris* species is thereby burdened by numerous synonyms and infrasubspecific names.

This variability also results in identification problems at the species level. One of the few European *Acleris* species which, in spite of remarkable variation, has always been considered easy to identify is *A. emargana* (Fabricius 1775) with its characteristic, and among European Tortricidae unique, emargination of the forewing costa. It was therefore surprising for us to see that Leraut (2003) described a new species of *Acleris* from northern Europe, allied to *A. emargana*. This author is well known for studying

old literature in order to 'dig' up the oldest name of any species (see e.g. Leraut 1997), but in this case he only discussed the old nomenclature briefly and proposed a new name, *A. stettinensis*, for the species discovered by him. This description was not published in a scientific journal, but in a 'semi-popular' book showing colour pictures of numerous insects.

We decided to test the validity of Leraut's findings, and below we present the results.

## Material and methods

*A. stettinensis* was described as a close relative of *A. emargana*, both in wing markings and in genitalia. We dissected a number of *A. emargana* of both sexes and compared them without first separating them on external characters. It turned out that, despite the differences being only small, these genitalia slides fall into two groups. Comparing the moths from which the genitalia were dissected also resulted in two groups: one with more or less similar, brownish grey specimens, and one with some rather variable specimens. The latter group fits *A. emargana* as currently understood, whereas the first group matches Leraut's *A. stettinensis*. Based on the differences described below we are of the opinion that Leraut is correct and these two groups represent distinct species. The type series of *Acleris emargana blackmorei* Obraztsov was borrowed from the USNM, and the genitalia of both sexes were compared with those of *A. stettinensis* and found to agree in every detail.

## Abbreviations

- BMNH The Natural History Museum, London, U. K.  
 HMUG Hunterian Museum, University of Glasgow, Glasgow, U. K.  
 MTD Staatliches Museum für Tierkunde, Dresden  
 MZHF Zoological Museum, University of Helsinki, Finland  
 USNM National Museum of Natural History, Washinton D. C., U.S.A.  
 ZMHB Zoologisches Museum der Humboldt Universität, Berlin, Germany  
 ZMUC Zoological Museum, University of Copenhagen, Denmark

## RESULTS

### *Acleris effractana* (Hübner, 1799)

Figs. 1–4, 9, 11

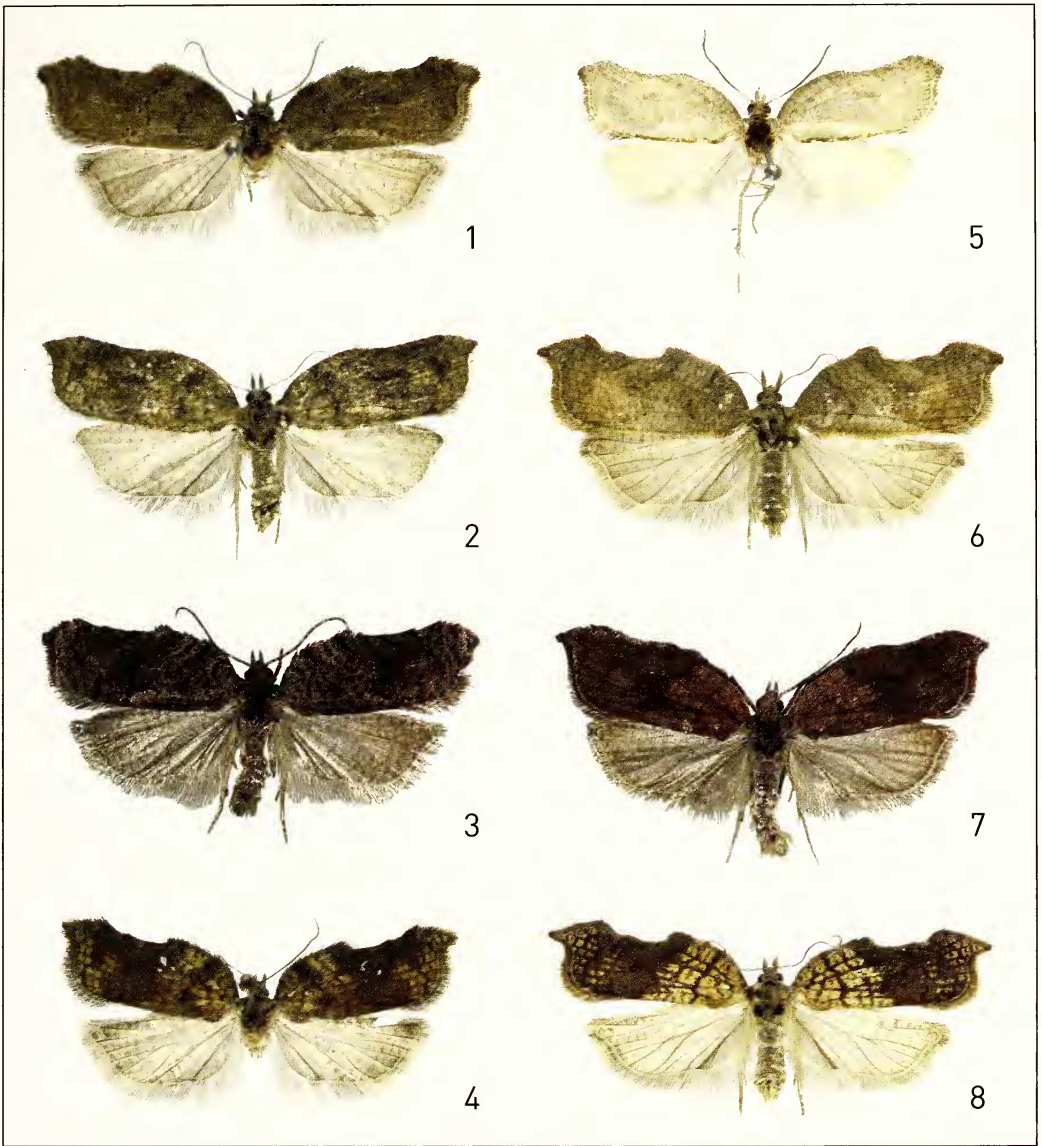
[*Tortrix*] *effractana* Hübner, 1799: pl. 28 fig. 175.

*Rhacodia emargana* f. *fuscana* Sheldon 1930: 148. Infrasubspecific name.

*Acleris emargana blackmorei* Obraztsov 1963: 268–269. **Syn. n.** (examined by DA & KT).

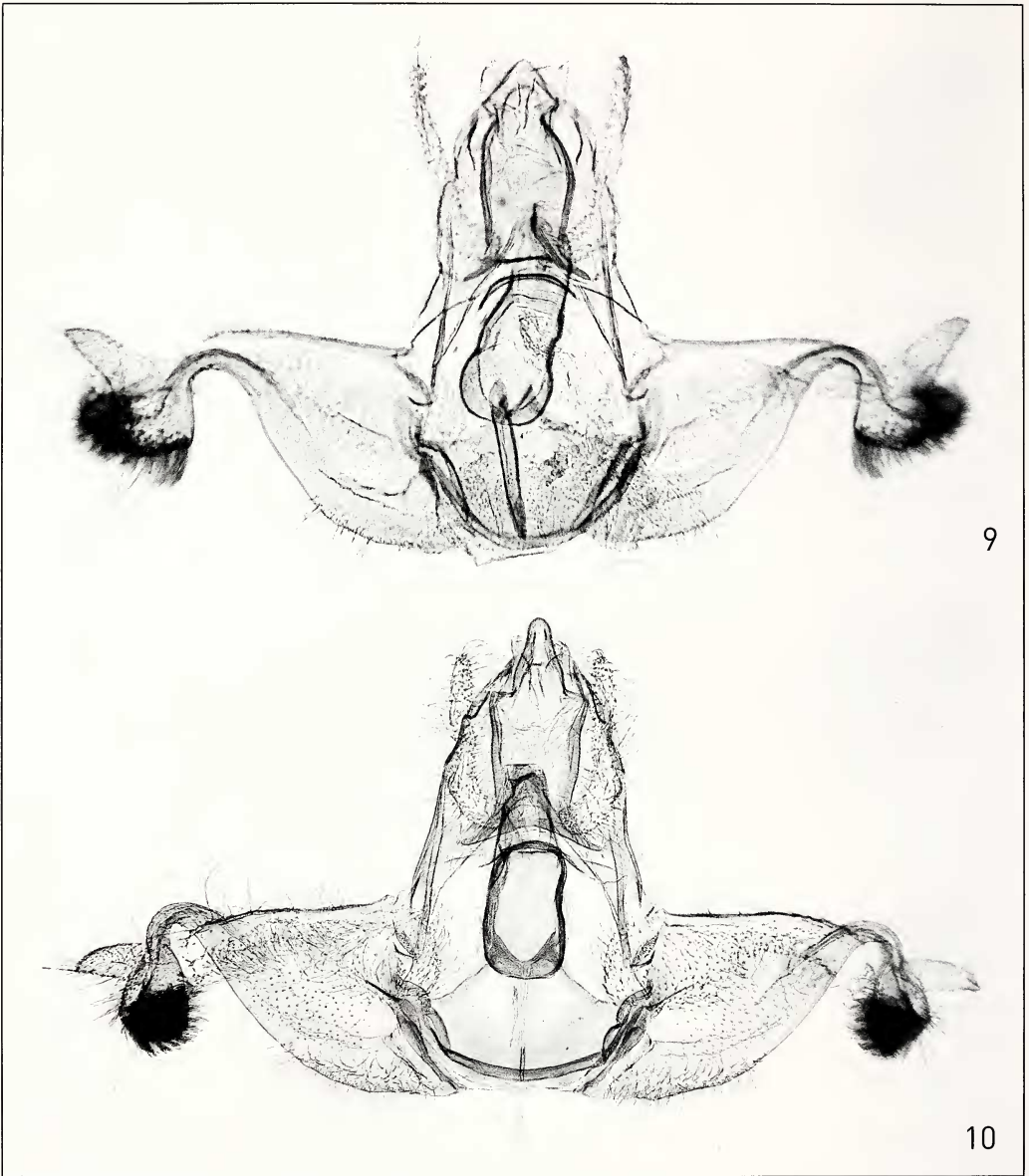
*Acleris stettinensis* Leraut 2003: 327, fig. 20; pp. 500–501, figs. 1, 3. **Syn. n.** (examined by OK).

**Diagnosis** (Figs. 1–4). Wingspan 21–23 mm. Forewing costa with emargination, ground colour brownish fuscous; pattern obsolete, costal triangle indicated as a darker shadow, and weak network pattern indicated by thin lines; groups of blackish erect scales form lines that emphasize the sub-basal fascia and inner edge of the median fascia. Hindwing light grey, more or less reticulate. The depth of the costal emargination varies, but is usually rather slight and not as deep as in most specimens of *A. emargana*. In some specimens the pre-tornal area appears weakly reddish.



**Figs. 1–4.** *Acleris effractana* (Hübner). **1–2.** ♀, Denmark (ZMUC, photos: Brovad). **3.** ♂, Great Britain (BMNH, photo: DA). **4.** ♀, Denmark (coll. K. Larsen, photo: Brovad).  
**Figs. 5–8.** *A. emargana* (Fabricius). **5.** ♂, Denmark (ZMUC, photo: Brovad). **6.** ♀, Czech Republic (ZMUC, photo: Brovad). **7.** ♂, Great Britain (BMNH, photo: DA). **8.** ♀, Denmark (ZMUC, photo: Brovad).

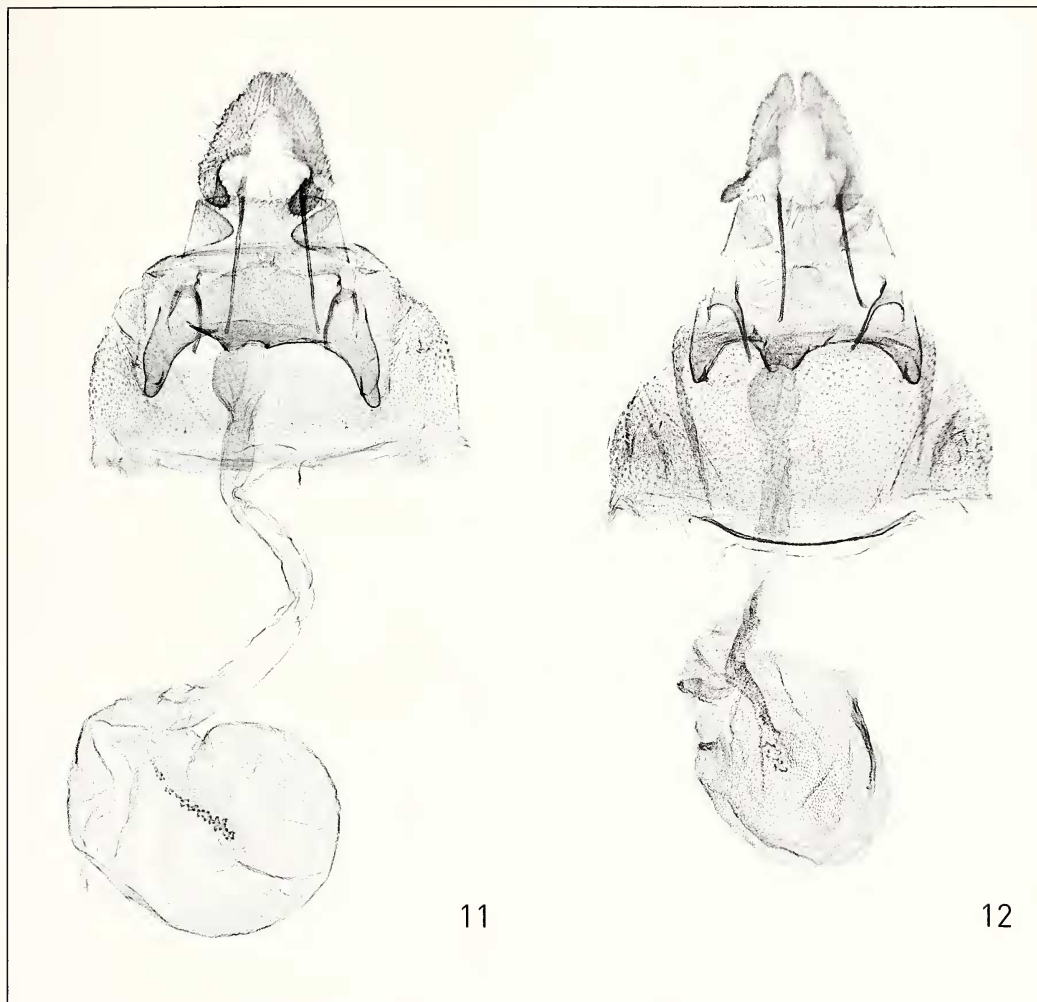
There is a form (Fig. 4) equivalent to the typical form of *A. emargana*, with ochreous ground colour and dark reticulate pattern. It differs from *A. emargana* by heavier dark suffusion, particularly the line forming the sub-basal fascia is thicker. It is apparently without a name. Dark, nearly unicolorous specimens with blackish groups of raised scales and weak emargination of costa certainly belong to *A. effractana*. One should, however, be aware that the raised scales are easily rubbed off, and are usually lacking in worn specimens. “Typical” *A. effractana* are figured by Bradley et al. (1973: fig. 11)



**Figs. 9–10.** Male genitalia (photos: PH, based on genitalia slides prepared by LA). **9.** *A. effractana* (Hübner). **10.** *A. emargana* (Fabricius).

under the infrasubspecific name *fuscana* Sheldon, by Buhl et al. (2004: fig. 3) and Leraut (2003: 327, fig. 20).

Male genitalia (Fig. 9). Socii slender, basally broader, reaching as far as tip of uncus, or even beyond this; uncus rather broad, nearly as a rounded triangle; sacculus of valva subterminally constricted; phallus short, straight, with small subterminal carina, no cornuti. The most reliable character versus *A. emargana* is the distinctly longer socii. The shape of uncus is variable in *A. emargana*, but is on the average narrower in



**Figs. 11–12.** Female genitalia (photos: PH, based on genitalia slides prepared by LA). **11.** *A. effractana* (Hübner). **12.** *A. emargana* (Fabricius).

*A. emargana* than in *A. effractana*. The carina of the phallus is smaller in *A. effractana* than in *A. emargana*, but this character is also variable to some extent.

Female genitalia (Fig. 11). Sterigma distally convex; the extensions of its anterior corners with small terminal process; ductus bursae membranous, widening before ostium; signum weak, with small teeth, split in two or three parts. For differences from *A. emargana* see under that species. Leraut (2003: 501, fig. 3) in his description of *A. stettinensis* indicated differences between the two species in the size of the papillae analis, the shape of the anterior corners of the sterigma, and the shape of the posterior part of ductus bursae. However, study of numerous slides of the female genitalia of the two species has shown that these characters are variable. The only reliable specific character seems to be the difference in the relative length of the ductus bursae in the two species.

**Life history.** The larva is bluish green. It lives between leaves spun together in the terminal shoots of *Salix pentandra* (Buhl et al. 2004: 33, 41), in the British Isles it has been bred from tubed leaves of *Salix purpurea* and from spun leaves of *S. cinerea* and *S. purpurea*, larvae being found in June. Adults can be found (in Denmark) from the end of July to early October.

**Distribution.** Holarctic. Throughout North Europe and northern part of Central Europe: Single records from the west of Ireland and one old specimen from northern England (a single specimen from Surrey in southern England may be due to mislabelling); widespread in Scotland where it occurs with *A. emargana*, usually less common, but in the Hebrides and Northern Isles (Shetland and Orkney) it is the commoner species; in Denmark widely distributed, but more local than *A. emargana* (see Buhl et al. (2004: 40-41) for list of material); in Norway scattered all over the country, almost to North Cape; throughout Sweden (Svensson 2005: 32); nearly all of Finland, most common towards north (Kullberg et al. 2002); Estonia (U. Jürivete, in litt.); Latvia (N. Savenkov, pers. comm.); Germany (Braunschweig and Neustrelitz (Fischer von Röslerstamm 1839), Bautzen in Sachsen (coll. MTD)); Poland: Szczecin ['Stettin'] (Leraut 2003), (NW) Russia (Leraut 2003; Kullberg, in litt.), Japan (Yasuda 1965); Canada and north-western USA (Obraztsov 1963). The occurrence in Central Europe, especially in mountainous areas such as the Alps seems well possible but no specimens belonging to *A. effractana* could be examined so far.

**Remarks.** *Tortrix effractana* was figured and named by Hübner (1799: pl. 28 fig. 175) without accompanying description. The type locality is not stated, but Hübner's figure was based on material received from Zincken (Fischer von Röslerstamm 1839: 141), and it is thus likely that it originated from the Braunschweig area in northern Germany where Zincken lived. Hübner's figure 175 is difficult to interpret, as discussed by Frölich (1828: 27), and according to Fischer von Röslerstamm (1839) it is characterized by traits of both *Acleris* species discussed in this paper. However, Fischer von Röslerstamm was well aware of these two species, and he argued in details that Hübner's *effractana* represents the grey brown species with two lines of small black scales in the middle of the forewing ("die ziemlich deutlichen (in der Natur aus schwarzen Schuppen-Puncten bestehenden) beiden Linien in Mittelraume").

As it is indeed possible that the figure is drawn from specimens of both we here, in order to stabilize nomenclature, designate a neotype [*Tortrix*] *effractana* Hübner. All the qualifying conditions of section 75.3 of the ICZN Code, 4th edition are met. We agree with Fischer von Röslerstamm's opinion on the identity of *A. effractana*, and select as neotype a specimen of the species with two lines of small black scales in the middle of the forewing. It is a female in good condition, labelled: '9.8.[18]73' 'Stettin' 'ex collect. Staudinger' 'NEOTYPE *Tortrix effractana* Hübner, [1799] O. Karsholt design, 2005' (ZMHB). The locality Stettin [now Szczecin in Poland] was then a part of Germany.

The year of publication for *Tortrix effractana* (Hübner) was erroneously stated to be 1822 by Brown et al. (2005: 48).

*A. blackmorei* was described by Obraztsov as a subspecies of *A. emargana* from a series of specimens from western Canada (British Columbia and Ontario) and U.S.A.

(Washington State). He commented that the species name “had been adopted from labels on genitalia slides prepared by Busck who considered *A. blackmorei* to be a separate species”. Obraztsov preferred to publish the taxon at subspecific rank as he believed, erroneously, that there were no genitalic differences between it and *A. emargana*.

*Rhacodia emargana* f. *fuscana* was described from an unstated number of specimens from Ireland (Sheldon 1930: 148). Infrasubspecific name.

*A. stettinensis* was described from 11 males and 7 females from Germany, Great Britain, Poland and Russia, all of them old specimens with insufficient label data. The holotype originated from Szczecin [‘Stettin’] in Poland. None of the Russian specimens have exact locality data. The type series is exclusively of the rather unicolorous brown form.

Leraut (2003: 500) compared his *A. stettinensis* with *A. emargana*, *A. emargana tibetica* and *A. blackmorei*, stating that also the latter differs in the genitalia, but without stating the differences.

The figures of an adult and of female genitalia shown for *A. emargana* from Japan (Yasuda 1965: figs. 50, 79) most likely belong to *A. effractana*.

The form with ochreous ground colour and dark reticulate pattern is much rarer than the equivalent, typical form of *A. emargana*; we have only seen few specimens of this form from Denmark and Norway.

### *Acleris emargana* (Fabricius, 1775)

**Figs. 5–8, 10, 12**

*Pyralis emargana* Fabricius 1775: 651 (examined by DA & KT).

*Pyralis caudana* Fabricius 1775: 651 (examined by DA & KT).

*Tortrix excavana* Haworth 1811: 408 (examined by DA & KT).

*Teras caudana* var. *ochracea* Stephens 1834: 168.

*Acalla emargana* f. *fasciana* Müller-Rutz 1927: 505–506. Infrasubspecific name.

*Rhacodia emargana* f. *griseana* Sheldon 1930: 124. Infrasubspecific name.

*Acalla* var. *caudana* f. *brunneastriana* Weber 1945: 356. Infrasubspecific name.

*Acleris emargana tibetica* Razowski 1964: 412–414, fig. 93 (examined by DA & KT).

**Diagnosis** (Figs. 5–8). Wingspan 19–23 mm. Forewing costa with emargination that varies much in depth. Ground colour yellow-ochreous with reticulate pattern; median fascia sharply defined inwardly, becoming more diffuse distally, confluent with indistinct preapical spot. Hindwing greyish white, almost translucent, with slight reticulation, particularly in terminal half. This diagnosis applies to the typical form. The most common form (Fig. 6) has indistinct markings, ground colour ochreous, and grey suffusion except in tornal part. This form can easily be confused with *A. effractana*. It has groups of erect scales in the basal half of the wing, but these appear whitish, not black as the ones in *A. effractana*. The emargination of the forewing costa is generally deeper than in *A. effractana*. According to Bradley et al. (1973: 219) the name *caudana* should be restricted to a rare form with a reddish or orange streak along dorsum, whereas the common form should be called f. *griseana* Sheldon.

**Male genitalia** (Fig. 10). As in *A. effractana*, but *socii* not reaching as far as tip of uncus; uncus narrower than in *A. effractana*; subterminal carina of phallus larger than in *A. effractana*.

Female genitalia (Fig. 12). As in *A. effractana*, but ducus bursae shorter. The only reliable difference between *A. effractana* and *A. emargana* seems to be in the length of the ductus bursae. The ratio between the width of the sterigma and the length of ductus bursa is from 0.71 to 1.03 (in average 0.84; n=11) in *A. emargana*, and from 0.48 to 0.64 (in average 0.56; n=8) in *A. effractana*.

**Life history.** The larva is, when young, whitish green, later light green with almost similar coloured pinacula and a darker dorsal line. The head is honey-coloured with some black dots; thoracic plate and legs are light green. It feeds in late May and in June in folded leaves, or between two leaves, of especially *Salix caprea*, occasionally also on *Betula* and in Norway also on *Populus tremula*. It pupates in the second half of June between the leaves or among moss. The pupa is light brown, its proximal end is broad, horn-shaped, with two strong, curved thorns (Fischer von Röslerstamm 1839: 142, pl. 54). According to Bradley et al. (1973: 219) it also feeds on *Betula*, *Corylus* and *Alnus*. Adults can be found from July to September.

**Distribution.** North, Central and eastern Europe; recently recorded from Spain (Huesca) (Beltrán 2005); According to Razowski (1984: 200) throughout Siberia to China, Korea and Japan. These records probably refer to both *A. emargana* and *A. effractana*. In MZHF are specimens of *A. emargana* from Siberia (Altai and Buryatia) and from North China (Heilongjiang) (J. Kullberg in litt.). In Tibet subspecies *tibetica* Razowski, 1984.

**Remarks.** *Pyralis emargana* was described from an unspecified number of specimens from England, probably collected by Lee (Fabricius 1775: 651). The collection of J. Lee (or part of it) was stated to be in the University Museum of Oxford (Smith 1986: 133). DA sought there in vain for the types of *P. emargana* and *P. caudana*, and was informed that they may be in the HMUG, which turned out to be the case. We consider the single specimen there, which belong to the nominal form of *Acleris emargana*, to be the holotype of *P. emargana* Fabricius.

*Pyralis caudana* was described from an unspecified number of specimens from England. Fabricius (1775: 651) gives no origin of his specimens, but they may well have originated from Lee too. There are two specimens of the form with indistinct markings and ochreous-grey ground colour in the HMUG, and we consider these to be syntypes of *P. caudana* Fabricius.

*Tortrix excavana* was described from an unstated number of specimens from Great Britain. The name has in the past been attributed to Donovan (1794: 92). However, he did not describe *excavana*, but rather used it as an 'in litteris name', mentioning that it was "known among collectors" under that name. The name *excavana* represents specimens with ground colour varying from light to dark ferruginous-brown without the heavy strigulation or reticulation basally (Bradley et al. 1973: 219, pl. 46 figs. 9–10).

*Teras caudana* var. *ochracea* was described from an unstated number of specimens from England. It was stated to be of "a pale ochreous colour" (Stephens 1834: 168). As already pointed out by Sheldon (1930: 123) none of the specimens in the BMNH coming from the Stephens collection exactly matches that diagnosis, but are pale specimens of typical *emargana*.

*Acalla emargana* f. *fasciana* was described from two specimens from Switzerland (Schuls and Altberg an der Lägern) (Müller-Rutz 1927: 505–506). According to the



description it is similar to the form figured by Bradley et al. (1973, pl. 46 fig. 10). Infrasubspecific name.

*Rhacodia emargana* f. *griseana* was described from an unspecified number of specimens (“most frequently”) from Great Britain (Sheldon 1930: 124). Infrasubspecific name.

*Acalla* var. *caudana* f. *brunneastriana* was described from an unspecified number of specimens from Switzerland. It represents the form with greyish brown forewings with the dorsal part of the forewing red-brown. From the description *brunneastriana* is clearly an infrasubspecific name.

*Acleris emargana tibetica* was described from 11 specimens collected in Gyangste, Tibet, at an altitude of 3900 m (Razowski 1964: 412–413). We follow here Razowski (1984: 201) in regarding *tibetica* as a subspecies of *A. emargana*.

*Pyralis scabrana* Fabricius, 1781 has been listed as a further synonym of *A. emargana* by, e.g., Razowski (1984: 198). The type, which is kept in the HMUG was studied by DA and KT. It is a synonym of *Acleris kochiana* (Goeze, 1783) (syn. rev.), but it is also a secondary homonym of *Acleris scabrana* ([Denis & Schiffermüller], 1775) and thus invalid.

It is no surprise that the two main forms of the dimorphic *A. emargana*, the bi-coloured nominate form and the rather plain grey form (f. *caudana*), originally were considered different species and described accordingly. The first to show that these two only represent forms of the same species was Fischer von Röslerstamm (1839: 141–142), who repeatedly bred both forms from larvae which were indistinguishable. From his bred material, originating from Bohemia, about 6% were the nominate form, the large majority belonging to f. *caudana*. In the collection of ZMUC there are 343 specimens of *A. emargana*. About 40% of these belong to the nominate form, but this may well be an artefact caused by collectors wish to collect more specimens of the rarer and more beautiful nominate form.

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